

Chemistry of Life



Matter

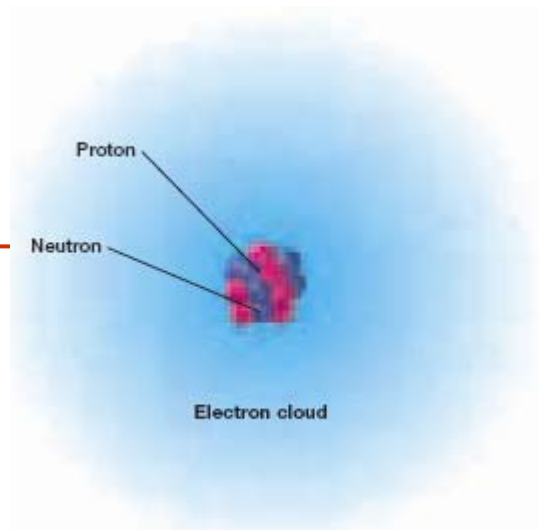
anything that has mass
and takes up space

All matter is made of atoms

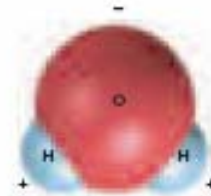
Atoms → electrons, protons, and neutrons

Elements → pure substances made of only 1 type of atom

Molecules → pure substances made of 2 or more types of atoms



Chemical Bonding



Covalent Bonds

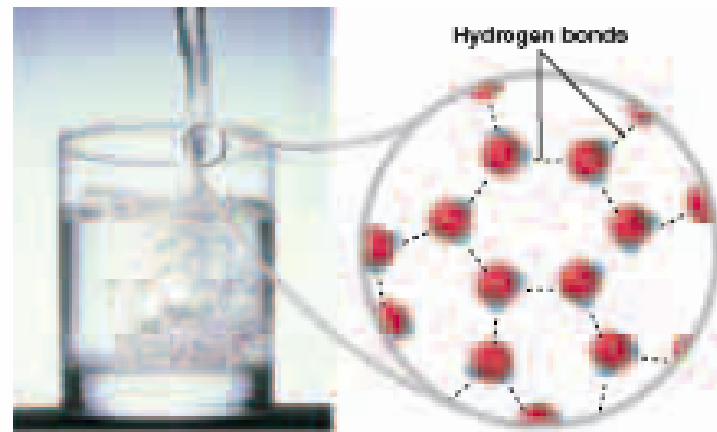
Molecules are groups of atoms linked by covalent bonds.

Hydrogen Bonds

Hydrogen bonding occurs between polar molecules.

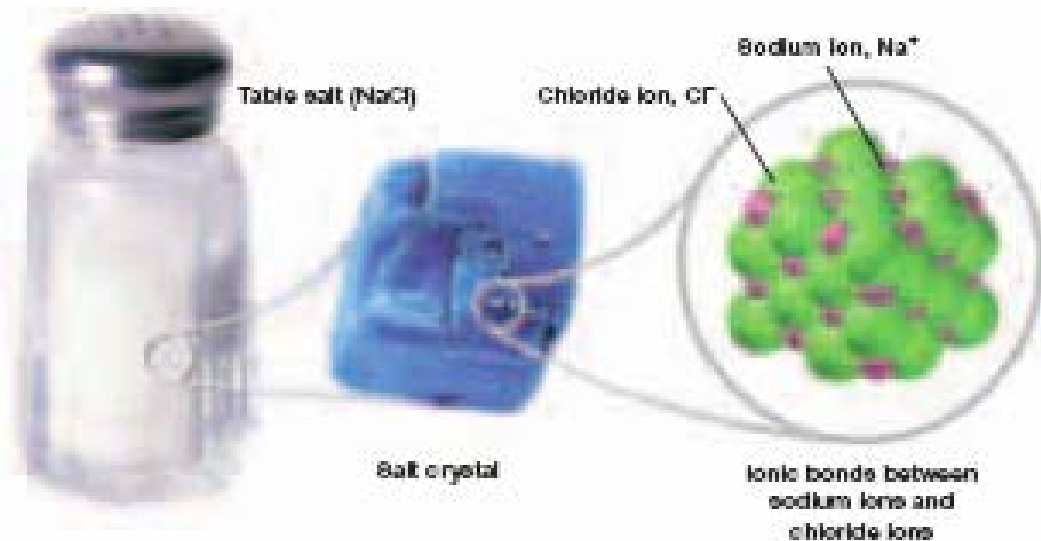
Figure 3 Hydrogen bonds in water

Water molecules are attracted to each other by hydrogen bonds.



Ionic Bonds

An ion is a charged atom or molecule.
Ions of opposite charge may form an ionic bond.



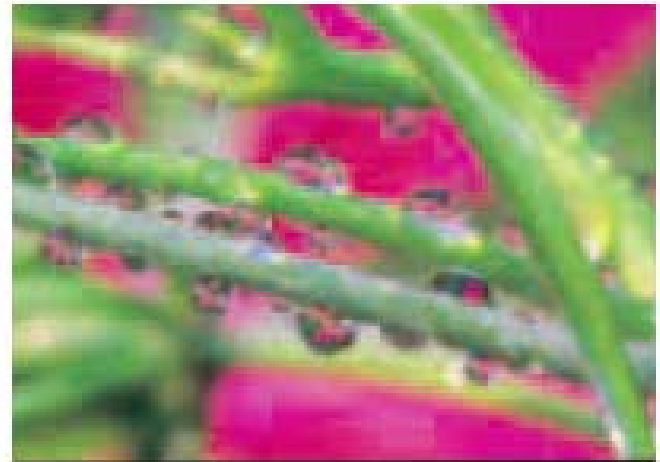
Properties of Water

Storage of Heat

Water stores heat efficiently

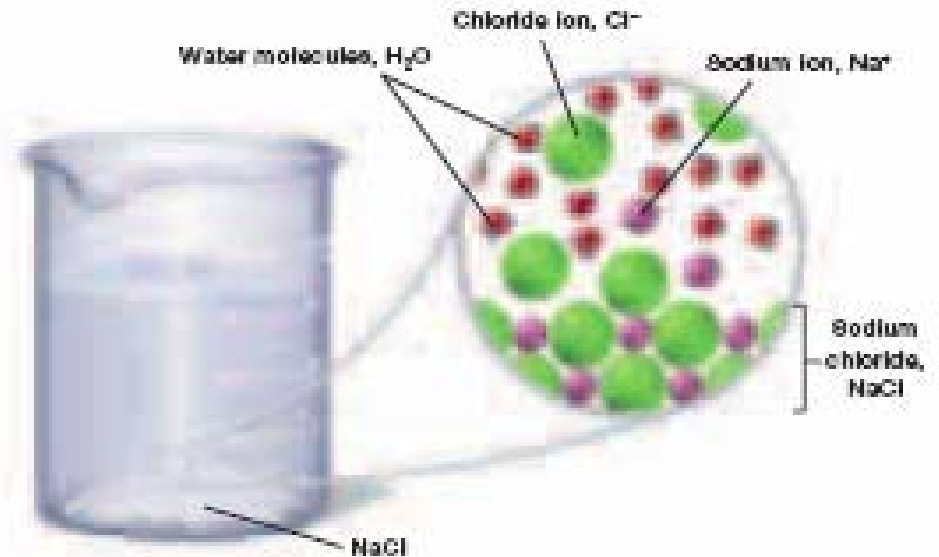
Cohesion and Adhesion

Water binds to itself and other substances.



Polarity

Water dissolves polar molecules and ionic compounds.



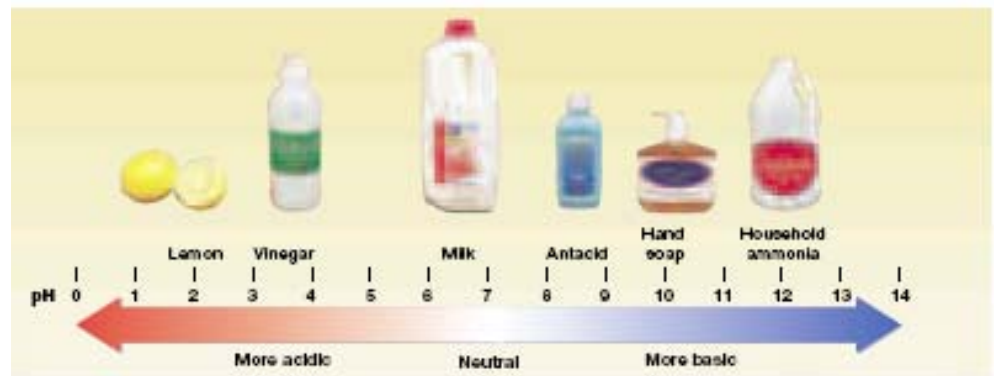
Acids and Bases

Acids increase the hydrogen ion concentration of a solution.

Bases decrease the hydrogen ion concentration of a solution.

pH scale

measures the strength of acids and bases.



Carbon Compounds

Carbohydrates

source of energy
structural materials

Lipids

nonpolar molecules
store energy
part of cell membranes.

Proteins

chains of amino acids.
sequence of amino acids determines a protein's shape and function

Nucleic Acids

store and transmit hereditary information.

ATP

main energy currency of cells.

ATP → ADP and ADP → ATP

Energy for Life Processes

Chemical reactions absorb or release energy.

Starting a chemical reaction requires activation energy

Enzymes

Enzymes and Activation Energy

Enzymes speed up chemical reactions by decreasing the activation energy of the reactions.

Enzyme Specificity

Enzymes bind only certain substrates.

Factors in Enzyme Activity

temperature

pH

